

Before the  
**FEDERAL COMMUNICATIONS COMMISSION**  
 Washington, D.C. 20544

**RECEIVED**

JUL - 8 1998

FEDERAL COMMUNICATIONS COMMISSION  
OFFICE OF THE SECRETARY

In the Matter of )

1998 Biennial Regulatory Review -- )  
 Amendment of Part 18 of the )  
 Commission's Rules to Update )  
 Regulations for RF Lighting Devices)

ET Docket No. 98-42

**COMMENTS OF IEEE 802 LAN/MAN STANDARDS COMMITTEE.****Introduction**

IEEE 802, the LAN/MAN Standards Committee ("the Committee") respectfully submits the following comments in response to the Commission's Notice of Proposed Rulemaking ("the Notice"), FCC 98-42.

The Committee's standard on Wireless LAN Media Access Control and Physical Layer Specification, IEEE Std 802.11 - 1997, operates in the 2400-2483.5 MHz band (henceforth, the 2450 MHz ISM band) using spread spectrum procedures under 47 CFR 15.247. Thus, systems conforming to the Committee's standard will be affected by Part 18 devices in the 2450 MHz ISM band. In addition, the Committee is concerned with the possible effects new ISM devices may have on the 2390 - 2400 MHz unlicensed PCS band, as well as the effect such devices may have on other radio systems operating near the 2450 MHz ISM band.

The Institute of Electrical and Electronics Engineers, Inc. (IEEE) is a USA-based international professional organization with more than 325,000 members representing a broad segment of the computer and communications industries. More than 58,000

members are from outside the USA. Within the IEEE, the IEEE Standards Association (IEEE-SA) is an ANSI accredited standards development organization.

The IEEE 802 LAN/MAN Standards Committee (IEEE 802) operates under the IEEE-SA to produce specific interoperability standards for Local Area Networks. The Local Area Network standards provide for data transfer between computers and/or computer terminals and include such widely known standards as Ethernet and Token Ring as well as the Wireless LAN standard. Many of the IEEE 802 standards have been adopted by the ISO/IEC as International Standards.

In 1997, the Committee adopted IEEE Std 802.11 - 1997, a standard for wireless Medium Access Control and Physical Layer protocols using the 2450 MHz ISM band for data rates up to 2 Mbit/s. Participants have a major investment in the development of the standard. Since 1990 when the effort started, the IEEE 802.11 Working Group has assembled 6 times a year to develop the draft, with an average of 80 persons participating. The participants are employed by companies from industries, such as manufacturers of computers, computer peripherals and chips and radio equipment, as well as aircraft manufacturers, service industries, government agencies and heavy industry. In addition to participants from the USA, there are participants from locations over the world, such as Europe, Japan, Israel, Korea and the Republic of China.

The ISO/IEC international standards organizations adopted an updated version of IEEE Std 802.11 - 1997 as an International Standard. The combined IEEE/ISO/IEC standard will be published in October of this year.

Additionally, the IEEE 802.11 Working Group is working to extend the standard for operation at higher data rates in the 2400 - 2483.5 MHz band. The current plan is to increase the data rate from 1 and 2 Mbit/s to greater than 10 Mbit/s.

The strong interest in wireless local area networking is evidenced by the number of individuals and corresponding company sponsorships in the IEEE P802.11 working group. The IEEE 802.11 Working Group currently has 86 voting members employed by 58 companies.

The following is a partial list of companies that are already offering or have announced standards-based components or products:

- Aironet Wireless Communications Inc
- AMD
- Bay Networks
- Breezecom
- Cabletron Systems Inc.
- Harris Semiconductor
- InTalk
- Intermec
- Lucent Technologies
- No Wires Needed
- NDC Communications
- OKI Semiconductor
- Phillips Semiconductor

- Proxim
- Raytheon
- Symbol Technologies

There is an installed base of approximately 6 million radios operating in this band. The growing market acceptance of wireless LANs is evidenced by an industry growth rate of between 40% and 60% for the past 5 years. The introduction of the standard is expected to accelerate wireless LAN adoption.

### **Detailed Comments**

New microwave lighting devices operating in the 2450 MHz ISM band should be required to meet the same out-of-band emissions requirements as do other intentional and unintentional radiator digital devices. The background section of the Notice states that the proposed emission limits were originally adopted based on the Part 15 radiated limits for digital devices. The Notice refers to sections 15.109 (a) and (b)<sup>1</sup>. While the proposed out-of-band limits conform to the referenced part 15 field strength values, ISM devices have traditionally only been required to meet the average field strength levels while other devices are required to meet both the average levels and a peak envelope power limit that is 20 dB higher than the average limit. Accordingly, the Committee requests that the peak envelope power limit for emissions outside the 2450 MHz ISM band, specified in section 15.35 (b) for digital devices and sections 15.109 (a) and (b), be required for microwave lighting devices operating in the 2450 MHz ISM band.

---

<sup>1</sup> Paragraph 12 and footnote 13 of the Notice.

The Commission recommends the use of FCC Measurement Procedure MP-5 to determine compliance with the technical requirements of Part 18<sup>2</sup>. MP-5 requires measurement with a detector function with a 1 MHz resolution bandwidth, as does Part 15.35, but MP-5 does not specify the video bandwidth. Currently a 3 Hz Video bandwidth is used with a voltage linear measurement to determine the field strength of microwave ovens that operate in the 2450 MHz ISM band. This is approximately equivalent to the 100 ms average specified for Part 15 digital devices in CFR 15.35 (c). However, CFR 15.35 (b) also requires that the peak envelope power be no higher than 20 dB above the average.

The Notice states that microwave lighting uses the same type of magnetron power source as microwave ovens<sup>3</sup>. The peak envelope power of some microwave ovens exceeds the average measure considerably (see the table below) and the peak envelope power is a much better measure of the effect the emissions have on other radio receivers than is the average.

The table shows that microwave ovens that meet the Part 18 out-of-band emissions average field strength requirement are detrimental to communications receivers far outside the 2450 MHz ISM band. Microwave lighting may have the same wide bandwidth pulsed effects as microwave ovens and, as shown in the table, some microwave ovens that meet the average limits have peak envelope power values as high as 54 dB above the average limits over a frequency range at least 50 MHz outside the

---

<sup>2</sup> CFR 15.311, Methods of Measurement

<sup>3</sup> Paragraph 10 of the Notice.

2450 MHz ISM band<sup>4</sup>. Microwave lighting should be expected to have this same level of out-of-band emissions unless attention is focused on the problem. The peak envelope power of microwave lighting devices as measured with a 1 MHz resolution bandwidth and a 1 to 2 MHz video bandwidth on a spectrum analyzer should be no more than 20 dB higher than the average power currently proposed in the Notice.

Oven	2300	2350	2400	2500	2550	2600
#	MHz	MHz	MHz	MHz	MHz	MHz
1	+14	+1	+21	+6	-1	-16
5	+1	+20	+29	+14	+4	+3
7	-8	-1	+2	-14	-26	-11
10	+10	+34	+26	+3	+15	-11
11	-16	-16	-14	-21	-15	-16

**Microwave Oven Samples from NTIA Measurement Report  
94-303-2**

The values are measures of the peak envelope power level at 3 meters using a 1 MHz resolution bandwidth and a 1 or 2 MHz video bandwidth. The values are relative to the peak levels permitted for digital devices by Part 15.35 (b). For example, the +34 dB level of device 10 at 2350 MHz is 34 dB higher than that permitted for digital devices and is 54 dB above the average required in Part 15.209. Device number 11 meets the peak limits of CFR 15.35 over the frequency range shown.

The Committee's standard was developed with a clear understanding of the effect of microwave ovens that operate in the 2450 MHz ISM band have on systems conforming to the standard. However, microwave lighting devices are likely to become much more

---

<sup>4</sup> NTIA report 94-303-2, Radio Spectrum Measurements of Individual Microwave Ovens.

pervasive – both in terms of placement and usage – than microwave ovens, particularly in shopping malls and warehouses as mentioned in the Notice<sup>5</sup>. These lighting devices will tend to operate a much larger percentage of the time, since they are left on many hours per day and operate at their full power setting all of the time. Therefore the two factors mitigating the impact of microwave ovens on such systems – first, that the ovens are only used intermittently, secondly, that they operate with less than 100% duty-cycle when not used at the full power setting – may not apply to microwave lighting devices.

It is also of importance to note that some microwave ovens do meet the complete Part 15 out-of-band digital device emission requirement. This, in itself, shows that such limits can be met.

The Committee notes that the Commission is concerned about the effect of microwave lighting devices on other licensed radio services operating near the 2450 MHz ISM band<sup>6</sup>. There are restricted bands (reference Part 15.205) in the frequency range 2200 - 2300 MHz and 2310 - 2390 MHz. Unless the peak limits are imposed, microwave lighting could exceed the restricted bands limits by 54 dB or more and the proliferation of such devices could nullify any limits placed on digital devices.

The Commission asks for comment on whether limits should be placed on in-band emissions of microwave lighting devices<sup>7</sup>. The Committee believes that the developers of such devices should be required to show whether better in-band limits can be achieved. However, we are only requesting that better limits be put on the out-of-band emissions.

---

<sup>5</sup> Paragraph 8 of the Notice.

<sup>6</sup> Paragraph 12 of the Notice.

<sup>7</sup> Paragraph 13 of the Notice.

We expect that such limits will control the in-band behavior somewhat and thus benefit  
unlicensed spread spectrum devices operating in and near the band.

Respectfully,




James T. Carlo (jcarlo@ti.com)

Chair, IEEE 802 LAN/MAN Standards

Texas Instruments

9208 Heatherdale Drive

Dallas TX 75234



Vic Hayes (vichayes@lucent.com)

Chair, IEEE 802.11, Wireless LANs

Lucent Technology

Zadelstede 1-10

3431 JZ Nieuwegein, the Netherlands

JULY 7, 1998